इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 13369 (1992): Stationary lead acid batteries (with tubular positive plates) in monobloc containers [ETD 11: Secondary Cells and Batteries]

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

REAFFIRMED 2002

IS 13369 : 1992

भारतीय मानक

मोनोब्लाक धारक में संचायक सीसा-अम्ल बैटरियाँ (पलिकाकार धनात्मक प्लेटों वाली) – विशिष्टि

Indian Standard

STATIONARY LEAD-ACID BATTERIES (WITH TUBULAR POSITIVE PLATES) IN MONOBLOC CONTAINER — SPECIFICATION

UDC 621·355·2·035·151

© BIS 1992

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

May 1992 **Price Group 3**

Secondary Cells and Batteries Sectional Committee, ETD 11

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Secondary Cells and Batteries Sectional Committee had been approved by the Electrotechnical Division Council.

To meet the ever increasing demand for source of energy for uninterrupted power systems (UPS) in domestic and small commercial establishments, presently single 2 V cells are connected in series and used for the required voltage system. This system being uneconomical for capacities and low voltage systems, need is felt for low cost compact battery system coupled with reasonable life.

This standard covers the requirements and methods of tests of compact monobloc battery assemblies using tubular positive plates.

The tests for performance specified in this standard are to be carried out in prevalent ambient conditions. The results of such tests should be corrected to the standard atmospheric conditions according to the correction factors specified.

The requirements of standby power, telephone exchange and power house are covered by IS 1651 : 1991; IS 1652 : 1990 covers stationary cells and batteries lead-acid type with plante' positive plates and IS 6304 : 1980 covers stationary cells and batteries lead-acid type with pasted plates.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 1 SEPTEMBER 2000
TO
IS 13369 : 1992 STATIONARY LEAD-ACID BATTERIES (WITH TUBULAR POSITIVE PLATES) IN MONOBLOC CONTAINER — SPECIFICATION

(*Page* 2, *clause* 6.2, *line* 4) — Add the following after 'containers':

'For transparent/translucent containers, level indicator is not necessary, but maximum and minimum electrolyte level lines shall be clearly marked on the containers.'

(*Page* 2, *Table* 1, *col* 2) — Substitute '120' *for* '125' against 12 V batteries.

(*Page* 5, *clause* 11.5.5, *line* 5) — Substitute '5 hours' *for* '6 hour rate'.

(*Page* 5, *clause* 11.7.3, *lines* 2 *and* 4) — Substitute '11.7.2' *for* '11.7.3' and '1.80 V' *for* '1.85 V' respectively.

(ETD 11)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 SEPTEMBER 2003
TO
IS 13369 : 1992 STATIONARY LEAD-ACID BATTERIES (WITH TUBULAR POSITIVE PLATES) IN MONOBLOC CONTAINER — SPECIFICATION

(*Page* 1, *clause* **5.2**, *and Annex* A) —Substitute 'IS 266:1993' *for* 'IS 266:1977' *and* 'IS 1069:1993' *for* 'IS 1069:1984'.

(*Page* 3, *clauses* **10.2.1** *and* **10.2.2**,) — Insert the following Note at the end of both the clauses:

'NOTE — Digital/Analog meters may be used.'

(*Page* 6, *Annex* A) — Substitute 'IS 1069:1993' *for* 'IS 1069:1964' and 'IS 266:1993' *for* 'IS 266:1977'.

(ET 11)

Reprography Unit, BIS, New Delhi, India

Indian Standard

STATIONARY LEAD-ACID BATTERIES (WITH TUBULAR POSITIVE PLATES) IN MONOBLOC CONTAINER — SPECIFICATION

1 SCOPE

This standard specifies Ah capacities, voltage, overall dimensions, performance requirements and tests for stationary lead-acid units (using tubular positive plates) in monobloc container.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

3.0 For the purpose of this standard, the definitions given in IS 1885 (Part 8) : 1986 in addition to the following, shall apply.

3.1 Fully-Charged Condition — The battery, which has first undergone initial charge as per manufacturer's instruction, shall be considered as fully charged when the cell specific gravity readings (corrected to temperature) and voltages remain constant over three consecutive hourly readings: the charging rate during the period being maintained constant at finishing rate specified by the manufacturer.

3.2 Type Tests — Tests carried out to prove conformity with the requirements of this standard. These are intended to prove the general quality and design of a given type of battery.

3.3 Acceptance Tests — Tests carried out on samples selected from a lot for the purpose of verifying the acceptability of the lot.

3.3.1 *Lot* — All batteries of the same type, design and rating, manufactured by the same factory during the same period, using the same process and materials, offered for inspection at a time shall constitute a lot.

4 RATING AND DESIGNATION

4.1 Ampere-Hour Rating

The rating assigned to the cell shall be the capacity expressed in ampere-hour (after correction to 27°C) stated by the manufacturer to be obtained when the cell is discharged at the 10-hour rate (C 10) to a final voltage of 1·80 volts/cell.

4.2 Designation

The battery shall be designated by symbols given below, arranged in the following sequence:

Type of positive plate	Ah rating of cell	Type of container
(*see* **4.2.1**)	(*see* **4.2.2**)	(*see* **4.2.3**)

4.2.1 The positive plates being of tubular type shall be designated by the letter 'T'.

4.2.2 The capacity rating shall be indicated by a number equal to the capacity in Ah.

4.2.3 The material of container shall be designated by any one of the following letters, as the case may be:

H — for hard-rubber;
P — for plastics; or
F — for fibre reinforced plastics (FRP)

4.2.4 Voltage of unit shall be either 6 or 12 volts and shall be incorporated in the designation.

Example — 6T — 100H denotes 6V unit with tubular positive plates and a capacity of 100 Ah in hard rubber container.

5 MATERIALS

5.1 Containers

The containers shall be made of hard rubber, plastics or fibre reinforced plastics (FRP).

5.1.1 Hard rubber and plastics containers shall conform to IS 1146 : 1981.

5.2 Electrolyte

The sulphuric acid and water used for the preparation and maintenance of electrolyte shall conform to IS 266 : 1977 and IS 1069 : 1984 respectively.

5.3 Sealing Compound

Sealing compound, if bitumen based, shall conform to IS 3116 : 1965.

5.4 Separators

The separators used shall be synthetic, which shall conform to IS 6071 : 1986.

6 CONSTRUCTIONAL REQUIREMENTS

6.1 Cell Lids

Cell lids shall be provided suitably. For hard rubber, it shall be of deep sealing types using bitumen and for plastics, it shall be either deep sealing type or glued type or sealed otherwise suitably.

NOTE — Methods of sealing used shall not contaminate the electrolyte when these come in contact. A suitable method for determining such requirements is under consideration and shall be included at a later date.

6.2 Electrolyte Level Indicator

A suitable electrolyte level indicator indicating lower and upper limits shall be fitted to facilitate checking of electrolyte level in opaque containers. The materials used shall be acid-proof and shall not deteriorate during service. However, each cell shall be provided with such level indicator.

6.3 Terminal Posts

Positive and negative terminal posts shall be clearly and unmistakably identifiable.

6.4 Connections

The connections from the end terminal of each unit to the adjacent unit or to the external circuit shall be made of lead plated aluminium/copper strips or of flexible insulated cable. The fittings on the cable shall be suitable for the type of terminals fitted to each unit.

6.5 Terminal Connectors, Nuts and Bolts

Bolts and nuts for connecting up to units shall be effectively lead coated to prevent corrosion.

7 CAPACITY AND DIMENSIONS

7.1 The amperes hour capacity, voltage (unit) and dimensions of units shall be in accordance with Table 1.

8 MARKING AND PACKING

8.1 Marking

The following information shall be indelibly and durably marked on the outside of the cell:

a) Indicating the source of manufacturer,
b) Ah capacity at 10-h rate,
c) Upper and lower electrolyte level in case of transparent container,
d) Year of manufacture, and
e) Country of origin.

8.1.1 The cells and batteries may also be marked with the Standard Mark.

8.2 Packing

The cells shall be suitably packed so as to avoid any loss or damage during transit.

9 MANUAL OF INSTRUCTIONS

9.1 The manufacturers shall supply one copy of instruction manual for initial treatment and routine maintenance during service, with every batch of batteries.

9.2 The following information shall be provided on the instruction cards:

a) Designation of cell or battery (*see* 4.2).
b) Ah capacity;
c) Nominal voltage;
d) Manufacturer's instructions for filling initial charging;
e) Normal and finishing charging rates; and
f) Maintenance instructions.

Table 1 Maximum Overall Dimensions of 6V and 12V Units

(*Clause* 7.1)

Voltage	Capacity at 10-h Rate	Maximum Overall Dimensions		
		Length	Width	Height
(1)	(2)	(3)	(4)	(5)
V	Ah	mm	mm	mm
6	20	480	186	385
6	40			
6	60			
6	80			
6	100			
6	120			
6	135			
6	165			
6	180			
6	200			
12	20	525	295	300
12	40			
12	60			
12	80			
12	100			
12	125			
12	150			

NOTES

1 The length and width dimensions given in this table may be interchanged.

2 For capacitors not covered in this table, the battery dimension shall not exceed the dimensions of the battery of next higher size covered by this table.

10 GENERAL REQUIREMENTS FOR TESTS

10.1 Temperature for Testing

Test discharge should not be taken when the temperature of the electrolyte exceeds 35°C or lower than 20°C.

10.2 Test Equipment

10.2.1 Voltmeter

The voltmeter used for tests shall be of an accuracy class not inferior to 0·5 in accordance with IS 1248 (Part 2) : 1983. The resistance of the voltmeter used shall be at least 1 000 ohms per volt [*see* IS 1248 (Part 2) : 1983]. The range of the voltmeter used shall be such that the magnitude of the voltage to the measured falls in the last third part of the scale.

10.2.2 Ammeter

The ammeter used for tests shall have an accuracy class not inferior to 1·0 [*see* IS 1248 (Part 2) : 1983]. The range of ammeter used shall be such that the magnitude of the current to be measured falls in the last third part of the scale.

10.2.3 Thermometer

A thermometer with an appropriate scale shall be used for measuring temperature and one division of the graduated scale shall represent at the most 1°C. The accuracy of the calibration shall be not less than 0·5°C.

NOTE — The voltmeter, the ammeter and the thermometer of digital read-out type of similar accuracy also can be used. Chart recorders shall be used for life cycle testing.

10.2.4 Hydrometer

The specific gravity of the electrolyte shall be measured by a hydrometer provided with a graduated scale, one division of which shall represent at the most 0·005 unit of specific gravity. The accuracy of calibration shall be not less than 0·005 unit of specific gravity.

NOTE — In view of the compact construction of this type of cells, it may not be possible to measure the specific gravity directly by a floating hydrometer. Hence, the use of syringe type of hydrometer shall generally have to be resorted.

10.3 First Charge

The cell, if received in dry uncharged condition, shall be filled with the electrolyte and shall be first charged in accordance with the manufacturer's instructions.

10.4 Specific Gravity of Electrolyte

The standard specific gravity of a fully charged cell shall be adjusted to 1·240 ± 0·005 corrected at 27°C.

10.5 Temperature Factors of Capacity

10.5.1 The correction of the capacity to 27°C shall be carried out in accordance with **10.5.2**. The values for correction factors shall be chosen from Table 2.

Table 2 Variation of Capacity with Temperature

(*Clause* 10.5.1)

Discharge Rate	Factor for Variation in Capacity per °C R
(1)	(2)
	Percent
C_{10}	0·43
C_5	0·54
C_3	0·68
C_1	0·90

NOTE — Capacity-temperature correction is not a true linear relationship.

10.5.2 The capacity shall be corrected to 27°C by the following formula:

$$\text{Capacity at } 27^\circ\text{C} = C_t + \frac{C_t \times R\ (27 - t)}{100}$$

where

C_t = observed capacity at t°C;

R = variation factor chosen from Table 2; and

t = average electrolyte temperature, °C (*see* **11.5.3**)

Example:

Capacity at C_{10} measured at 24°C — 1 000 Ah

Capacity at 27°C

$$= 1\,000 + \frac{1\,000 \times 0{\cdot}43 \times (27 - 24)}{100}$$

$$= 1\,012{\cdot}9 \text{ Ah.}$$

10.6 Observation

10.6.1 While charging the battery, the voltmeter, hydrometer and thermometer readings shall be recorded at suitable intervals.

10.6.2 During the discharge at 10-hour rate, the voltmeter readings shall be recorded every hour for the first eight hours and every fifteeen minutes thereafter up to the end voltage.

10.6.3 The hydrometer and thermometer readings at hourly intervals and at the end of the discharge shall be recorded only on the pilot cell(s).

10.7 Water shall be added, if required to correct the electrolyte level during the test, just before the charge so that thorough mixing with electrolyte is facilitated.

11 TESTS

11.1 Classification of Tests

11.1.1 *Type Tests*

The following shall constitute type tests and shall be carried out in the given sequence:

a) Verification of constructions requirements (**11.2**);
b) Verification of marking (**11.4**)
c) Verification of the dimensions (**11.4**);
d) Test for capacity (**11.5**);
e) Ampere-hour and watt-hour efficiency tests (**11.8**);
f) Test for loss of capacity on storage (**11.6**);
g) Endurance test (**11.7**);

11.1.2 *Acceptance Tests*

The following shall constitute the acceptance tests:

a) Marking and packing;
b) Verification of dimensions; and
c) Test for capacity.

11.1.2.1 Acceptance tests shall, normally, be carried out, at the discretion of the purchaser on each cell after installation at site. The date and place of testing shall be subject to agreement between the purchaser and the supplier.

11.1.2.2 *Sampling scheme and criteria for acceptance*

The sampling scheme and criteria for acceptance for cells up to and including 600 Ah capacity shall be as follows:

For cells up to and including 600 Ah—

Lot Size	*Samples*
Up to 50	2 units of 6 V or 12 V
51 to 300	2 units of 6 V or 12 V
300 to 500	3 units of 6 V or 12 V
501 to 1 000	4 units of 6 V or 12 V
1 000 and above	5 units of 6 V or 12 V

The sampling scheme for cells of higher capacities shall be subject to agreement between the user and the manufacturer.

11.2 Verification of Constructional Requirements

The cells shall meet with the requirement specified under **6**.

11.3 Verification of Marking and Packing

The marking on the cells and their packing shall be in accordance with the requirements of **8**.

11.4 Verification of Dimensions

The overall dimensions of cells of standard capacities shall conform to the requirements given in Table 1.

11.5 Test for Capacity

11.5.1 After standing on open circuit for not less than 12 hours and not more than 24 hours, from the completion of a full charge, the cell shall be discharged through a suitably variable resistance at a constant current of $I = 0{\cdot}1\, C_{10}$ amperes. The discharge shall be stopped when the closed-circuit voltage across the cell falls to 1·80 volts per cell.

If however a test discharge cannot be conducted within the specified rest period due to any exigencies; a freshening charge may be given to the cell/battery at the finishing rate of charge recommended by the manufacturer for a period of 1 hour after every 24 hours or part thereof, of extended rest period. The capacity test, however, can be started after a minimum period of two hours elapsing after this freshening charge.

11.5.2 The time in hours elapsing between the beginning and the end of discharge shall be taken as the period of discharge.

11.5.3 The average temperature t°C of the electrolyte during discharge shall be the average of the temperatures of the electrolyte noted at hourly intervals.

11.5.4 Unless otherwise agreed, capacity test as described above, and conducted immediately after the first charge of the cell is normally to be treated as the test discharge for the purpose of acceptance of the cell. On the first discharge the cell shall give not less than 85 percent of the rated capacity and the rated capacity shall be reached within 10 discharges subsequent to the initial charge. Once the rated capacity has been met on any discharge, further discharge cycles for capacity shall not be continued.

11.5.5 For the purpose of acceptance test, the test for capacity may, by agreement between the purchaser and the supplier, be carried out at a rate other than the 10 h rate. In such cases, either 3 hours or 6 hours rate is recommended at discharge rates corresponding to Table 3 to the specified final voltages.

11.5.6 Corrections for the variation of capacity with temperature shall be made in accordance with **10.5**. The measured temperature shall be as specified in **11.5.3**.

11.5.7 Requirements

11.5.7.1 The actual capacity shall not be less than the rated capacity and the test as carried out as given in Table 3.

Table 3 Capacities and Final Cell Voltage at Various Rates of Discharge at 27°C

Rate of Discharge	Capacity Expected at Percentage of C10 Capacity	End Voltage. Volts
C_1	50·0	1·75
C_3	71·7	1·80
C_5	83·3	1·80
C_{10}	100·0	1·80

11.5.7.2 For acceptance test when the test is carried out at a rate other than the 10 h rate the actual capacity shall be not less than the corresponding rated capacity.

11.6 Loss of Capacity on Storage

11.6.1 This test shall be carried out on the two batteries which have successfully passed the capacity test in accordance with **11.5**.

11.6.2 The cells shall be fully recharged at the current specified by the manufacturer and shall then be submitted to two consecutive capacity tests in accordance with **11.5**, the values of the initial capacity *C* being calculated as the mean of the two results thus obtained.

11.6.3 After a complete recharge and the cleaning of electrolyte from its surface the batteries shall be left in open circuit for a period of 28 days without disturbance at a temperature of 27 ± 5°C.

11.6.4 After the storage for 28 days, the battery shall be discharged in accordauce with **11.5**. The value of capacity measured after storage is denoted by c'.

11.6.5 The loss of capacity *S* expressed as a percentage is calculated from the following formula:

$$S = \frac{C - c'}{C} \times 100$$

11.6.6 *Requirement*

The loss in capacity thus measured shall not exceed 10 percent.

11.7 Endurance Test

11.7.1 The tests shall be conducted on cells which have not been subjected to any other tests subsequent to initial charge as per the manufacturer's instructions.

11.7.1.1 The test shall be conducted on a complete cell up to a capacity of 500 Ah. However, for those cells above this rating, a test cell with a suitable number of positive plates (of the type used in that particular cell alongwith negative plates and separators and other accessories) such that the cell capacity does not exceed 500 Ah, shall be built in a suitable sized container.

11.7.2 The cell shall be charged continuously at a current I = 0·1 × C_{10} amperes for periods of 2 000 hours as given below:

a) 2 — cycles of 300 h charging followed by test discharge

b) 3 — cycles of 200 h charging followed by test discharge

c) 8 — cycles of 100 h charging followed by test discharge

11.7.2.1 Throughout these periods of charge the cell shall be immersed in a tank of water the temperature of which shall be maintained at 40 ± 3°C. The cell shall be so immersed that the top of cell is 25 mm above the water level in the tank. If several cells are placed in the same tank, a distance of 25 mm shall be maintained between them. The distance between a cell and the sides of the tank shall be at least 25 mm.

11.7.3 At the end of each period of charging (a), (b) and (c) as specified in **11.7.3**, the cell shall be subjected to a test discharge (C_{10}) to an end voltage of 1·85 V. This discharge shall be conducted without undue delay and without removing the cell from the water bath and shall be made within two hours, of termination of the charging current (**11.7.2**).

If for any reason, the time between the termination of charging (**11.7.2**) and the test discharge exceeds 2 hours, the cell in the water bath may, at the option of the manufacturer, be kept on a trickle charge not exceeding $I = 0{\cdot}01 \times C_{10}$ amperes until the time of test discharge.

11.7.3.1 When the test discharge is completed, the cell shall be immediately subjected to the next period of continuous charge without any recharging.

11.7.4 Requirements

The cell shall give not less than 9 h of discharge at the final test discharge after the last period of charge.

11.8 Ampere-hour and Watt-hour Efficiency Tests

11.8.1 *Ampere-hour Efficiency*

A fully charged battery shall be discharged at $I = 0{\cdot}1 \times C_{10}$ amperes to an end voltage of 1·80 volts, careful calculations being made of the exact number of ampere-hours delivered. On recharge, the same number of ampere-hours are put back at the same current. A second discharge shall then be made to the same current. A second discharge shall then be made to the same cut-off voltage as before. The efficiency of the battery is then calculated as the ratio of the ampere-hour delivered during the second discharge to the ampere-hour put in on the charge.

11.8.1.1 *Requirements*

The ampere-hour efficiency when calculated as described in **11.8.1** shall be not less than 90 percent.

11.8.2 *Watt-hour Efficiency*

The watt-hour efficiency shall be calculated by multiplying the ampere-hour efficiency by the ratio of average discharge and recharge voltage. The values of discharge and recharge voltage shall be calculated from the log sheets for ampere-hour efficiency test.

11.8.2.1 *Requirement*

The watt-hour efficiency when calculated as described in **11.8.2** shall be not less than 75 percent.

ANNEX A

(*Clause* 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
266 : 1977	Specification for sulphuric acid (*second revision*)
1069 : 1964	Specification for water storage batteries (*revised*)
1248 (Part 2) : 1983	Specification for direct acting indicating analogue electrical measuring instruments and their accessories : Part 2 Ammeters and voltmeters (*second revision*)
3116 : 1965	Specification for sealing compound for lead-acid batteries
6071 : 1986	Specification for synthetic separators for lead-acid batteries (*first revision*)
6304 : 1980	Specification for stationary batteries lead-acid type with pasted positive plates (*first revision*)

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standard

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writting of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designation. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc : No ETD 11 (3155)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75
Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :		Telephone
Central :	Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	331 01 31 331 13 75
Eastern :	1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola CALCUTTA 700054	37 84 99, 37 85 61, 37 86 26, 37 85 62
Northern :	SCO 445-446, Sector 35-C, CHANDIGARH 160036	53 38 43, 53 16 40, 53 23 84
Southern :	C. I. T. Campus, IV Cross Road, MADRAS 600113	41 24 42, 41 25 19, 41 23 15, 41 29 16,
Western :	Manakalaya, E9 MIDC, Marol, Andheri (East) BOMBAY 400093	632 92 95, 63 27 80, 632 78 92

Branches : AHMADABAD, BANGALORE, BHOPAL, BHUBANESHWAR, COIMBATORE FARIDABAD, GHAZIABAD, GUWAHATI, HYDERABAD, JAIPUR, KANPUR, LUCKNOW, PATNA, THIRUVANANTHAPURAM.

Printed at Printwell Printers, Aligarh, India